



**RASC**

REVOLUTIONARY AEROSPACE SYSTEMS CONCEPTS

**An Early Revolutionary**  
from Prometheus Bound by Aeschylus c.a. 430 BC

*Daughters of Oceanus:*  
Hast not more boldly in aught else transgressed?

*Prometheus:*  
I took from man expectancy of death.

*Daughters of Oceanus:*  
What medicine found'st thou for this malady?

*Prometheus:*  
I planted blind hope in the heart of him.

*Daughters of Oceanus:*  
A mighty boon thou gavest there to man.

*Prometheus:*  
Moreover, I conferred the gift of fire.

*Daughters of Oceanus:*  
And have frail mortals now the flame-bright fire?

*Prometheus:*  
Yea, and shall master many arts thereby.



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**Workshop on Revolutionary Aerospace Systems  
Concepts for Human & Robotic Exploration of the  
Solar System**

**Hampton, VA  
November 6-7, 2001**

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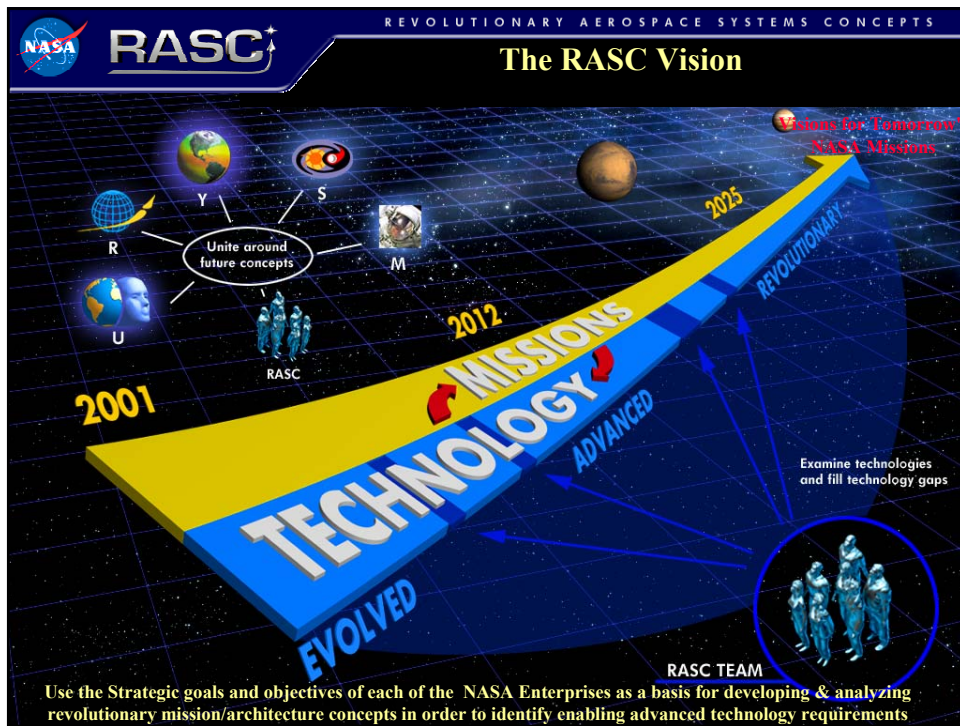
## **The NASA Langley Challenge for Revolutionary Aerospace Systems Concepts**

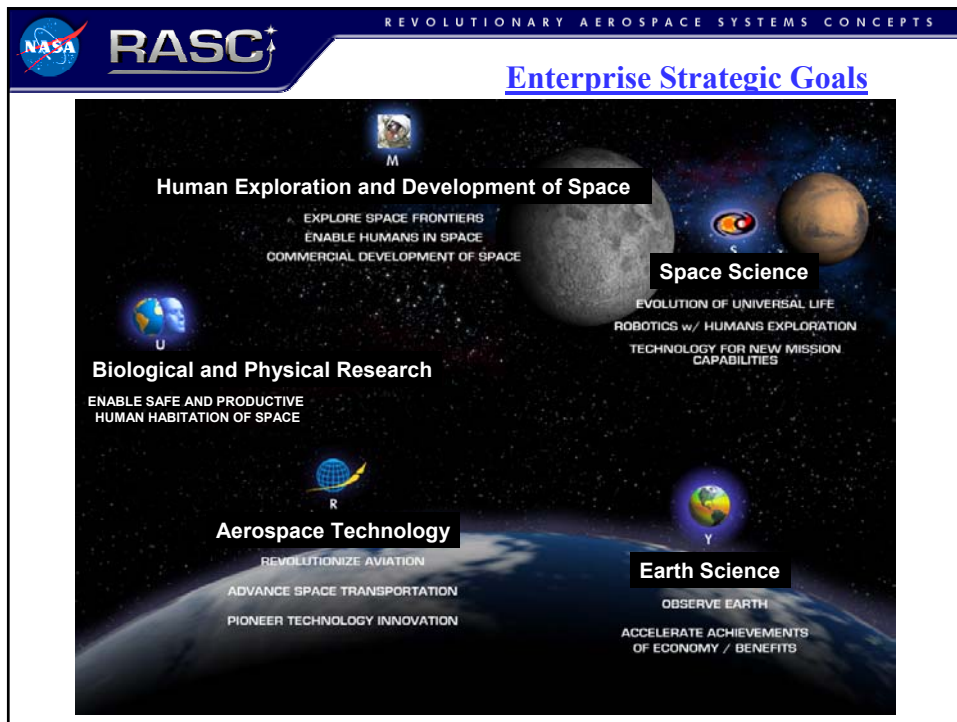
...create a new role for Langley as a leader for the assessment of revolutionary aerospace system concepts and architectures, and provide resources needed to assure technology breakthroughs will be there to support these advanced concepts. This is critical in determining how NASA can best invest its resources to enable future missions and I am going to provide the seed money to get this critical activity started today.



## **RASC Charter**

- **The RASC Team will focus on the exploration of revolutionary new approaches to enabling NASA to achieve its strategic goals and objectives in future missions. A “top-down” approach will be used to address the following areas:**
  - Project beyond the next 25-years to determine desired new capabilities derived from NASA Enterprise objectives and priorities
  - Define integrated systems approaches (architectures) and their required functional capabilities or engineering challenges
  - Explore revolutionary systems concepts to provide these capabilities
  - Conduct systems trade studies to define the enabling technology requirements and levels of performance needed to meet the challenges
  - Recommend the most promising revolutionary concepts with their integrated system payoffs and key enabling technology requirements





**NASA RASC** REVOLUTIONARY AEROSPACE SYSTEMS CONCEPTS

## RASC Initiative

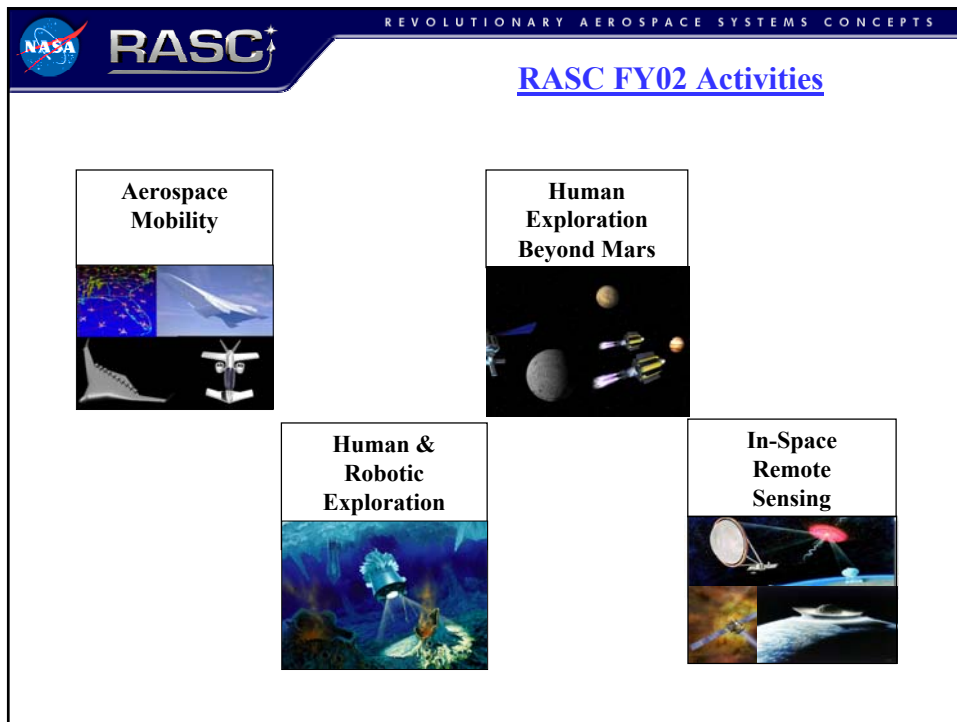
**Customers: NASA Strategic Enterprises:**

- Aerospace Technology - Code R (POC - Robert Pearce)
- Human Exploration of Space - Code M (POC - Gary Martin)
- Space Science - Code S (POC - Harley Thronson)
- Earth Science - Code Y (POC - Granville Paules)
- Biological and Physical Research - Code U (POC - Guy Fogleman)

**Participants:**

- Langley Research Center (Lead)
- Ames Research Center (FY 2001 only)
- Glenn Research Center
- Goddard Space Flight Center
- Johnson Space Center
- Kennedy Space Center (FY 2001 only)
- Marshall Space Flight Center
- Jet Propulsion Laboratory


**Coordination:** NASA Institute for Advanced Concepts (NIAC)



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### FY02 RASC Study Selections

- **Human & Robotic Exploration**
  - Advanced In-Space EVA Capabilities (JSC)
  - Human Emplacement of Lunar Telescopes (LaRC)
  - Human and Robotic Cooperative Teams Beyond Low-Earth Orbit (JPL)
  - Human/Robotic Exploration Advanced Concept Development Using Revolutionary Aerospace Technologies (LaRC)
  - Airborne Planetary Exploration (LaRC)
- **Human Exploration of the Solar System Beyond Mars**
  - Human Exploration of the Moons of the Outer Planets (LaRC)
  - Central Libration Power Station For Earth Neighborhood Operations (GRC)
  - Multifunctional Concepts for Radiation Health Risks Mitigation (LaRC)
  - Orbital Aggregation and Space Infrastructure Systems (OASIS) (LaRC)
  - Fusion Propulsion (MSFC)
  - High Power Plasma Propulsion (MSFC)
  - Sustained High-Power Generation (MSFC)




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## FY02 RASC Study Selections (concluded)

- **Aerospace Mobility Studies**
  - Global/Orbital Transport (LaRC)
  - Advanced National Airspace Concepts (LaRC)
  - Quiet Green Transport (LaRC)
  - Personal Air Vehicle Exploration (PAVE) (LaRC)
  
- **In-Space Remote Sensing**
  - Space-Based Imaging Interferometry
  - Concepts to Image Black Hole Event Horizons
  - Study of Revolutionary Earth Sciences Architecture for Atmospheric Chemistry, Earth Radiation Balance, and Geomagnetism Measurements
  - Comet and Asteroid Protection System (CAPS)
  - Planetary Body Maneuvering



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## Planned FY 2002 Human & Robotic Exploration Activities

- **5 Study activities are currently planned for FY2002**
  - **Human/Robotic Exploration Advanced Concept Development Using Revolutionary Aerospace Systems (LaRC/USRA)**
    - Scenario development
    - Concept development
    - Revolutionary Technology Identification and Assessment
  - **Human and Robotic Cooperative Teams Beyond LEO (JPL)**
    - Focus on hybrid Human/Robotic system architectures
  - **Advanced In-Space EVA Capabilities (JSC)**
    - Focus on in-space EVA capabilities to enhance operations through improved space suit flexibility with associated technology roadmap
  - **Human Emplacement of Lunar Telescopes (LaRC/USRA)**
    - Assess effectiveness of astronomical telescopes on the Moon and their optimum design features
  - **Airborne Exploration of the Planets (LaRC)**
    - Assess airborne systems concepts for the purpose of identifying the long-term technology program required to reduce concept risk and increase cost effectiveness

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## Workshop Goals

- **Gather initial input from a broad range of industry, academic, and government Human and Robotics *experts* in order to:**
  - Address NASA science and exploration goals
  - Identify potential revolutionary systems concepts
  - Identify the required technologies to enable these concepts
  - Evaluate the relative roles of humans and machines to implement these concepts
  - Identification of the science and the exploration and development of space goals that would be enabled by these future capabilities

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## Workshop Structure - Tuesday

Overview of NASA Enterprise Goals

Overview of NIAC Request for Information activity

Overview of Human & Robotic Enabled Science

Parallel Sessions covering:

	Human Exploration	Robotic Exploration	Human/Robotic Collaboration
University Perspective			
Industry Perspective			
Government Perspective			



## Workshop Structure - Wednesday

Overview of Human & Robotic Performance

Overview of Human and Machine Cognitive Prostheses

### **Revolutionary Technology Presentations**



**Revolutionary Planetary  
Scenarios Development**



**Revolutionary Platform  
Scenarios Development**

